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1.	Your reference	P3642.A4/PAG	30 OCT 2002
2.	Patent application number *(The Patent Office will fill in this par.*	0225235.1	30OCT02 E759681-2 001070 P01/7700 0.00-0225235.1
3.	Full name, address and postcode of the or of each applicant *(underline all surnames)* Patents ADP number *(if you know it)* If the applicant is a corporate body, give the country/state of its incorporation	Looplifter Ltd Melton Lodge Farms Melton Lodge Farm House Woodbridge Suffolk, IP12 1LY UNITED KINGDOM UNITED KINGDOM	08494900
4.	Title of the invention	Support Device	
5.	Name of your agent *(if you have one)* "Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)* Patents ADP number *(if you know it)*	DUMMETT COPP 25 THE SQUARE MARTLESHAM HEATH IPSWICH IP5 3SL 6379001	
6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number	Country	Priority application number *(if you know it)* / Date of filing *(day / month / year)*
7.	If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application	Date of filing *(day / month / year)*
8.	Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:* *a) any applicant named in part 3 is not an inventor, or* *b) there is an inventor who is not named as an applicant, or* *c) any named applicant is a corporate body.* *See note (d))*	YES	

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Description	12
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Abstract	1
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Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	ONE
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11. I/We request the grant of a patent on the basis of this application.

Signature Dummett Copp Date

DUMMETT COPP 29th October 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

Peter Gemmell
01473 660600

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SUPPORT DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention.

The present invention relates to a support device for securing to bulk bags for the storage and transport of bulk materials.

2. Description of the Prior Art.

Bags for storage and transport of bulk materials, for example half-tonne, one-tonne, or two-tonne capacity bags, are typically of generally cuboid shape, formed from a fabric material such as polypropylene. Typically, the weight of fabric material will be from about 180 g/m^2 to 400 g/m^2 depending on the intended load and operating conditions. The fabric may be reinforced for extra strength.

The bags have a top which is either permanently fully open or which can be opened, for loading. The bottoms of the bags are typically provided with a discharge spout through which the contents of the bag can be emptied when the spout is opened. Alternatively, the base of the bag may be cut to discharge the contents if the bag is not to be re-used.

To enable such bags to be lifted and manoeuvred by a fork-lift truck, each bag is typically provided with a lifting strap or loop at each corner. Such bags are often called Flexible Intermediate Bulk Containers (FIBC), or bulk

bags. The term "bulk bags" will be used herein to denote such bags.

To lift a filled bulk bag, a fork-lift operator brings the tines of the fork close to the top of one edge of the filled bag so that each tine is adjacent to a lifting loop. An assistant lifts up each lifting loop to enable a tine to pass through the loop while the operator moves the tines forward over the bag. The fork-lift operator moves the tines further over the top of the bag until the tines are adjacent the rear pair of lifting loops, and the process is repeated so that the tines are disposed through the rear lifting loops. The bulk bag can then be lifted and moved.

A problem with this procedure is that there is a danger of injury to the assistant when the tines or the fork are moved. This is a particular problem when filled bulk bags are stacked high, on top of each other. The fork-lift operator is unable to see the rear pair of lifting loops when the stack is too high, and the assistant may be injured by a tine or pushed off a ladder. It is also costly to employ two men to secure the bulk bag on the fork.

If no assistant is present, the fork-lift operator must move the truck so that the tines of the fork are positioned near the front loops. He must then get out of the cab of the truck, hook the front loops over the tines, and get back in the cab. He must then drive the truck forward as far as he thinks necessary, get out again, hook

the rear loops onto the tines (if he has judged the forward distance correctly), get back in the cab, drive further forward to pick up the bulk bag. The procedure is slow and can be dangerous.

To facilitate lifting of a bulk bag, it has been proposed in EP 0 259 230 to provide a rigid tubular cruciform structure to be secured in the loops of a bag so that pairs of tubes can receive the tines of a fork. In FR 2 721 304 it has been proposed to provide a similar disposable structure made of cardboard. To reduce the load to which lifting loops are subjected it has been proposed to provide bags with integral lifting slings along opposite top edges so that the load is spread out along those edges; see for example GB 1 549 448, GB 2 050 298, and GB 2 092 990. However, the use of such slings does not remove the need for a fork-lift operator either to leave the cab of his truck or to use an assistant to hook the tines of the fork-lift in the slings.

In WO 99/35058 it has been proposed to provide a bulk bag with a pair of parallel tubular guide members along the tops of opposed edges of the bulk bag. The tubular members are resilient and connected together by rigid spacing means at or adjacent to their ends. The lifting loops are supported upright by the tubular members, which function as guides for the tines of a fork-lift. This enables a fork-lift operator to insert the tines of the fork-lift through all four lifting loops in one movement and without leaving his cab. The tubular members may be formed from rubber or reinforced with a helically-wound

wire of metal or a plastics material so that they lie flat when under load but revert to a predetermined sectional shape when the load is removed. The resilience of the tubular members allows stacking of filled bulk bags without significant wasted space. A problem we have found with this device is that, if a heavy load is applied for a long time, the tubular members may not recover, or not fully recover, their initial shape so that insertion of a fork-lift's tines may be difficult or impossible without manual intervention.

SUMMARY OF THE INVENTION

According to the present invention there is provided a support device for securing to a bulk bag, the device comprising a pair of substantially parallel collapsible tubular guide members which are connected together at or adjacent to each end by spacers;

wherein each spacer comprises a pair of stiff elongate members connected together by a spring means;

each elongate member of each spacer being connected to each tubular member at a different location to that to which the other elongate member is connected;

whereby the support device will lie flat when under a suitable load but the spring means will cause the elongate members of each spacer to move apart relative to one another when the load is removed, thereby causing the tubular members to adopt a shape which is suitable for receiving and guiding the tines of a fork-lift.

By providing spring means in the spacers, problems of

insufficient opening of the tubular members may be overcome. Any suitable spring means may be used, but a preferred spring means is at least one coil spring, notably of metal. Such springs are of low cost and are readily available in a range of strengths and sizes. Preferably two springs are provided for each spacer, each close to a tubular member to improve the transmission of spring force thereto.

In a preferred embodiment, each elongate member of each spacer is connected to each tubular member at a substantially opposite surface to that to which the other elongate member is connected. For convenience, the invention will be described with reference to this preferred arrangement, which facilitates full opening of the tubular members. However, the connections could be circumferentially closer together if full opening of the tubular members is not necessary for them to receive the tines of a fork-lift, or if the tubular members have some resilience or elasticity so that they will spontaneously open further once they have been partially opened by the elongate members.

The elongate members should be sufficiently stiff to maintain the necessary separation between the tubular members to enable them to receive the tines of a fork-lift. The elongate members may be formed from any suitable structural materials, for example metal, wood, or structural plastics materials such as nylon, polycarbonate, polypropylene, polyethylene or other thermoplastics material. For strength and lightness a

cellular or corrugated structure is preferred. A particularly preferred material is extruded cellular polypropylene sheet, or "corrugated polypropylene", which combines lightness, strength, and low cost. A corrugated polypropylene which we have found works well is Correx® from Kaysersberg Plastics, Gloucester UK. Correx® is an extruded material which essentially comprises front and back sheets of polypropylene separated by webs of polypropylene to define a row of parallel channels of substantially square cross section. A preferred thickness is in the range 6 to 10 mm, notably about 8 mm (1800 $g/m^{2)}$. The upper limit is practical rather than critical. Additional thickness adds weight and increases manufacturing costs without providing a technical benefit.

The elongate members may be connected together only by the spring means; for example they may comprise a pair of opposed planks with one or more springs connected between them. In a preferred embodiment, however, the elongate members are also hingedly connected together along a long edge so that the spring means functions to bias the elongate members to a rest configuration in which the free long edges are separated by a specified distance. The invention will, for convenience, be described with reference to this preferred embodiment hereinafter.

The tubular members need to be able to withstand the large sideways crushing forces exerted on them by the lifting loops of the bulk bags when loaded. The tubular members may be formed for a plastics material, notably a thermoplastic material. Suitable plastics materials

include nylon, polycarbonate, polypropylene and polyethylene. For increased strength the material may be cellular or corrugated. A particularly preferred material for the tubular members is a corrugated polypropylene, typically of a thinner material than that used for the spacers. A preferred thickness of Correx® is 2 to 4 mm, notably about 3 mm (450 g/m^2).

The tubular members may be of any suitable width to accept the tines of a fork-lift; for example they may have a diameter in the range 100 to 300 mm, notably about 200 mm.

The tubular members may be of any sectional shape which will accept the tines of a fork-lift, for example circular, square, rectangular, or oval in cross section. However, it is preferred that they have a polygonal shape which resists inward folding when being flattened. A particularly preferred shape is a hexagon.

The device may support the lifting loops of a bulk bag by having those loops disposed around the tubular members. However it is preferred that each tubular member is provided with a slot or cut-out portion adjacent each end to receive at least a top portion of each loop, so that when the tines of a fork-lift are inserted into the tubular members under the top portions of the loops and lifted, the weight of the bulk bag will be carried by the straps. Tabs may be provided on the tubular members to cover the lifting loops and help retain the loops on the support device. Locking tabs may be provided on the loop-cover tabs to keep the loop-cover tabs in position over

the loops.

The spring-biased elongate members act as jaws which function to open or close the tubular members. Accordingly, another aspect of the invention provides a support device for securing to a bulk bag, the device comprising a pair of substantially parallel collapsible tubular guide members which are connected together at or adjacent to each end by spacers;

wherein each spacer comprises a pair of axially stiff jaws which are movable between a closed position in which they are close together and an open position in which they are further apart;

the jaws being urged by spring means to adopt the open position; and

the jaws being connected to the tubular members in a manner whereby when the jaws are in the closed position they will cause the tubular members to lie substantially flat, and when the jaws are in the open position they will cause the tubular members to adopt a shape which is suitable for receiving and guiding the tines of a fork-lift.

Other aspects and benefits of the invention will appear in the following specification, drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be further described, by way of example, with reference to the following drawings wherein:

Figure 1 is a perspective view of a support device in accordance with an embodiment of the present invention;

Figure 2 is a front perspective view of a spacer of the support device of Figure 1;

Figure 3 is a rear perspective view of the spacer of Figure 2;

Figure 4 is a perspective view of a spring for the support device of Figure 1;

Figure 5 shows the mounting of a spring in the support device of Figure 1;

Figure 6 illustrates stages of the securing of lifting loops of a bulk bag to the support device of Figure 1;

Figure 7 is an end elevational view of a tubular member of the support device of Figure 1; and

Figure 8 shows the support device of Figure 1 mounted on a bulk bag, being lifted by a fork-lift.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The support device 2 shown in Figure 1 comprises a pair of collapsible tubular guide members 4 connected together near their ends by spacers 6. Each tubular member 4 has a hexagonal cross section and is formed from 3 mm thick 450 g/m^2 Correx® corrugated polypropylene. The tubular members 4 are formed by cold-rolling score lines in a sheet of Correx® to define fold or hinge lines, and then hot-welding the sheet to itself at an overlapping region 30, as best shown in Figure 7. The tubular member 4 has a hexagonal sectional shape, with a flat top and flat bottom. The two side apices are opposed to each other with substantially equal circumferential edge lengths above and below them. This facilitates flattening of the tubular members under a suitable load in a controlled manner and without inward folding of the walls which would interfere with full flattening of the tubes.

Near the end of each tube there is partially cut out a loop-cover tab 12 and, from a region either side of the hinge 40 of the loop-cover tab 12, a locking tab 14. These tabs 12, 14 are used to secure the lifting loops 26 of a bulk bag to the support device 2 as best shown in Figure 6. With the loop-cover tab 12 lifted up, a lifting loop 26 of a bulk bag is located in the resulting cut-out portion 8 of the tubular member 4 (right side of Figure 6). The loop-cover tab 12 is then pushed down and locked in place over the loop 26 by tucking the locking tab 14 under the edge of the cut-out portion 8 opposite the hinge 40 (left side of Figure 6). This arrangement holds the

lifting loops 26 securely in the tubular members 4. For even greater security, more than one locking tab 14, for example two locking tabs, may be provided on each loop-cover tab 12. The loop-cover tabs 12 are cut so as to be wider than the width of the top flat surface of the tubular members 4, thereby providing a gap at each side sufficient to accommodate the lifting loops 26.

Each spacer 6 comprises a pair of stiff elongate members 32, in this example connected by central hinge portions 18, as best shown in Figures 2 and 3. Each end of each elongate member is secured to a surface of a tubular member 4 by securing means, in this example, a heat weld. The spacer 6 is formed from a single sheet of Correx® corrugated polypropylene (8 mm thick, 1800 gsm). The Correx® is cut to the desired shape, and three parallel axial slits are cut in the back surface, defining a central hinge line 34 and side hinge lines 36. Central slots 16 are cut out so as to leave central hinge portions 18, and side slots 20 are cut out to leave corresponding side hinge portions 38. The slitting of the back surface of the Correx® causes the spacer 6 to bow inwardly.

Holes 22 are provided near the ends of the elongate members 32 to enable the mounting of springs 10. Referring to Figure 4, each spring 10 in this embodiment is a coil spring of 2 mm spring metal and provided with a barb 24 at each end (European Springs and Pressings, Beckenham, UK). Referring now to Figure 5, each barb 24 is inserted into a flute of the Correx® in a side of the hole 22. The barb 24 bends the flute and engages with it

so as to prevent or inhibit removal of the spring 10 from the spacer 6. The springs 10 permit the spacer 6 to be folded flat when under load so that the elongate members 32 lie on top of each other, but they urge the elongate members apart when the spacer 6 is flat and will restore the spacer 6 to a rest configuration in which the free edges of the elongate members are spaced apart when the load is removed. In this rest configuration, as shown in Figure 1, the elongate members hold the tubular members 4 open to receive the tines 28 of a fork-lift, as illustrated in Figure 8. The tubular members 4 act as guides for the tines 28 but they do not carry the load, which is borne by the lifting loops 26 of the bulk bag.

The invention therefore provides a support device for supporting lifting loops of a bulk bag to facilitate handling by a fork-lift. The device will lie flat when under load but will reliably raise the lifting loops when the load has been removed, even after a long period of time under load.

CLAIMS

1. A support device for securing to a bulk bag, the device comprising a pair of substantially parallel collapsible tubular guide members which are connected together at or adjacent to each end by spacers;

wherein each spacer comprises a pair of stiff elongate members connected together by a spring means;

each elongate member of each spacer being connected to each tubular member at a different location to that to which the other elongate member is connected;

whereby the support device will lie flat when under a suitable load but the spring means will cause the elongate members of each spacer to move apart relative to one another when the load is removed, thereby causing the tubular members to adopt a shape which is suitable for receiving and guiding the tines of a fork-lift.

2. A device as claimed in claim 1, wherein each elongate member of each spacer is connected to each tubular member at a substantially opposite surface to that to which the other elongate member is connected.

3. A device as claimed in claim 1 or claim 2, wherein the elongate members of each spacer are hingedly connected together.

4. A device as claimed in any preceding claim, wherein the elongate members are formed from a corrugated plastics material.

5. A device as claimed in any preceding claim, wherein the elongate members are formed from corrugated polypropylene.

6. A device as claimed in claim 5, wherein the corrugated polypropylene is from 6 to 10 mm thick.

7. A device as claimed in claim 5, wherein the corrugated polypropylene is 8 mm thick.

8. A device as claimed in any preceding claim, wherein the spring means comprises at least one coil spring.

9. A device as claimed in claim 8, wherein the spring means comprises a pair of coil springs.

10. A device as claimed in claim 9, wherein the springs are located at opposite ends of the spacer and adjacent to the tubular members.

11. A device as claimed in claim 5, wherein the spring means comprises at least one coil spring having free ends provided with barbs and wherein the or each spring is connected between the elongate members by engagement of the barbs in channels in the elongate members.

12. A device as claimed in any preceding claim, wherein the tubular members have a hexagonal cross section.

13. A device as claimed in any preceding claim, wherein the tubular members are formed from a corrugated plastics

material.

14. A device as claimed in any preceding claim, wherein the tubular members are formed from corrugated polypropylene.

15. A device as claimed in claim 14, wherein the corrugated polypropylene is from 2 to 4 mm thick.

16. A device as claimed in claim 14, wherein the corrugated polypropylene is 3 mm thick.

17. A device as claimed in any preceding claim, wherein each tubular member has a slot or cut-out portion adjacent each end for receiving a portion of a strap or lifting loop of a bulk bag.

18. A device as claimed in claim 17, wherein each tubular member is provided with a loop-covering tab for each slot or cut-out portion, which is hingedly connected along an edge thereof.

19. A device as claimed in claim 18, wherein each loop-covering tab is integral with the tubular member and formed by cutting, and wherein each loop-covering tab is provided with a locking tab which is cut out from a region which spans the hinge connection and which locking tab can be tucked under a free edge of the cut-out portion to retain the loop-covering tab over the cut-out portion.

20. A support device for securing to a bulk bag, the

device comprising a pair of substantially parallel collapsible tubular guide members which are connected together at or adjacent to each end by spacers;

wherein each spacer comprises a pair of axially stiff jaws which are movable between a closed position in which they are close together and an open position in which they are further apart;

the jaws being urged by spring means to adopt the open position; and

the jaws being connected to the tubular members in a manner whereby when the jaws are in the closed position they will cause the tubular members to lie substantially flat, and when the jaws are in the open position they will cause the tubular members to adopt a shape which is suitable for receiving and guiding the tines of a fork-lift.

21. A support device for securing to a bulk bag, substantially as herein described with reference to or as shown in the drawings.

ABSTRACT

SUPPORT DEVICE

A support device (2) for securing to a bulk bag comprises a pair of substantially parallel collapsible tubular guide members (4) which are connected together at or adjacent to each end by spacers (6). Each spacer (6) comprises a pair of stiff elongate members (32) connected together by a spring means (10). Each elongate member (32) of each spacer (6) is connected to each tubular member (4) at a different location to that to which the other elongate member is connected. The support device will lie flat when under a suitable load but the spring means will cause the elongate members of each spacer to move apart relative to one another when the load is removed, thereby causing the tubular members to open to a shape which is suitable for receiving and guiding the tines of a fork-lift (28).

Figure 1

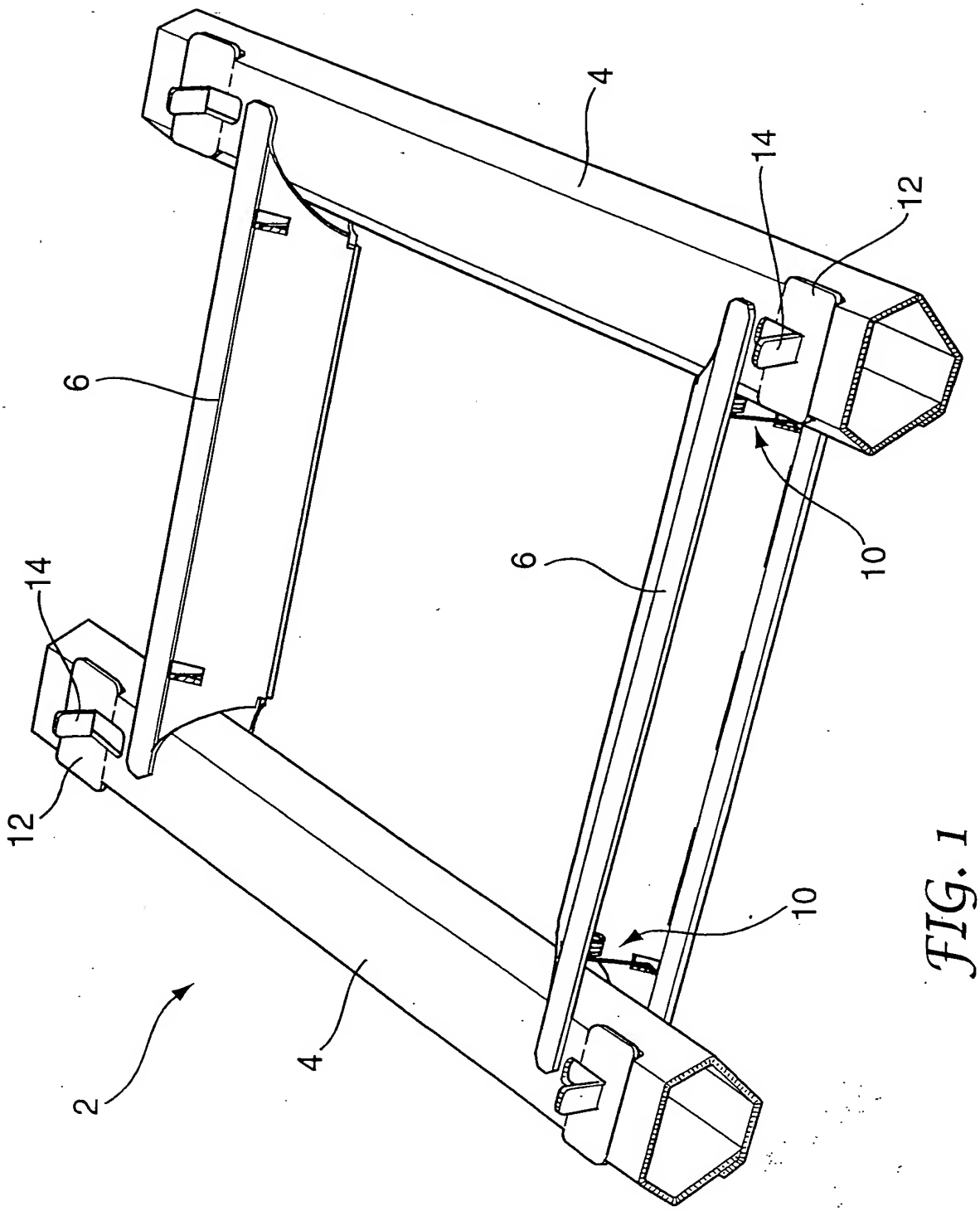

FIG. 1

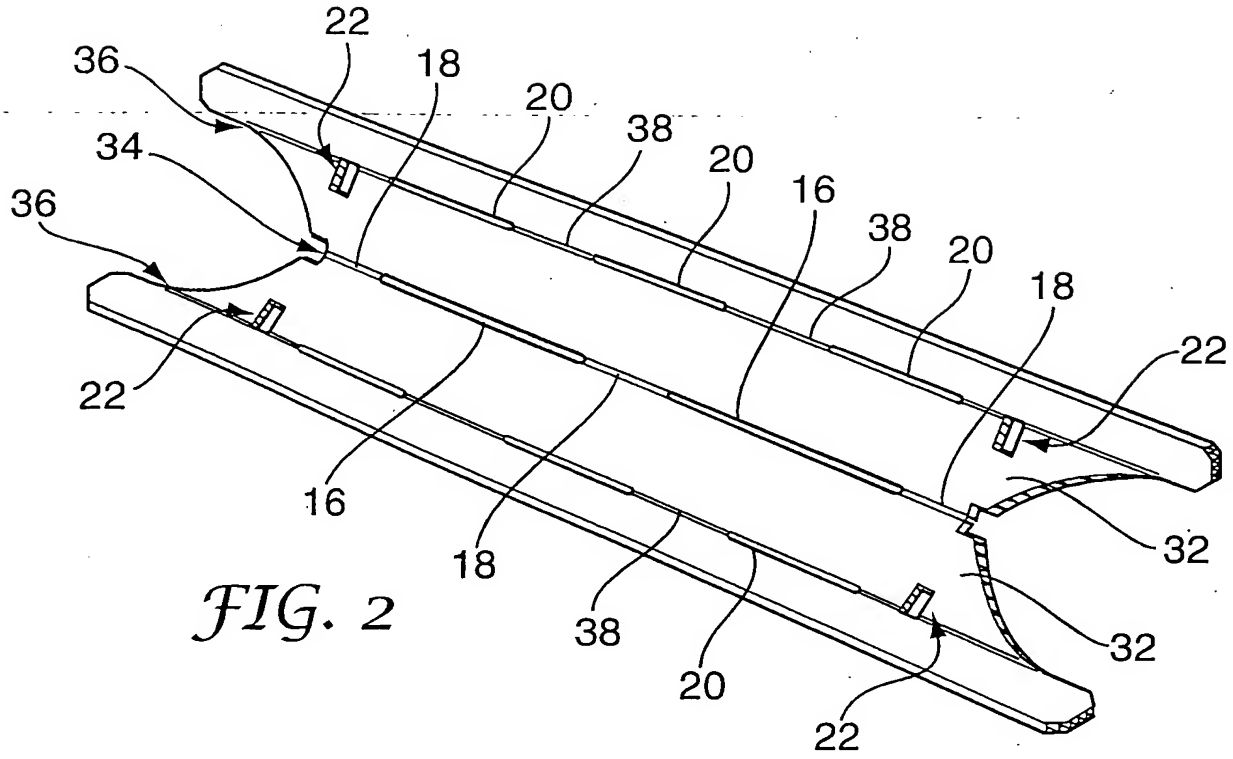
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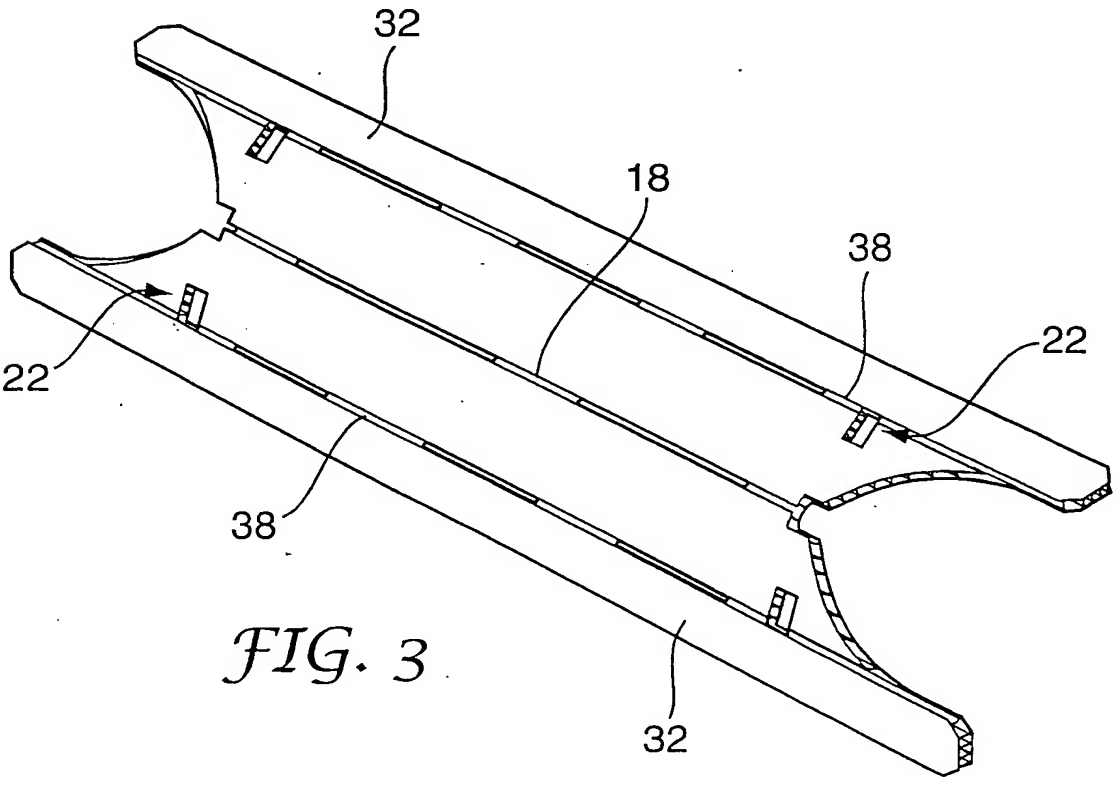
FIG. 2


32
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32

FIG. 3

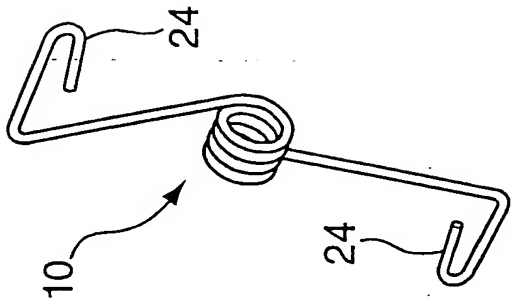

FIG. 4

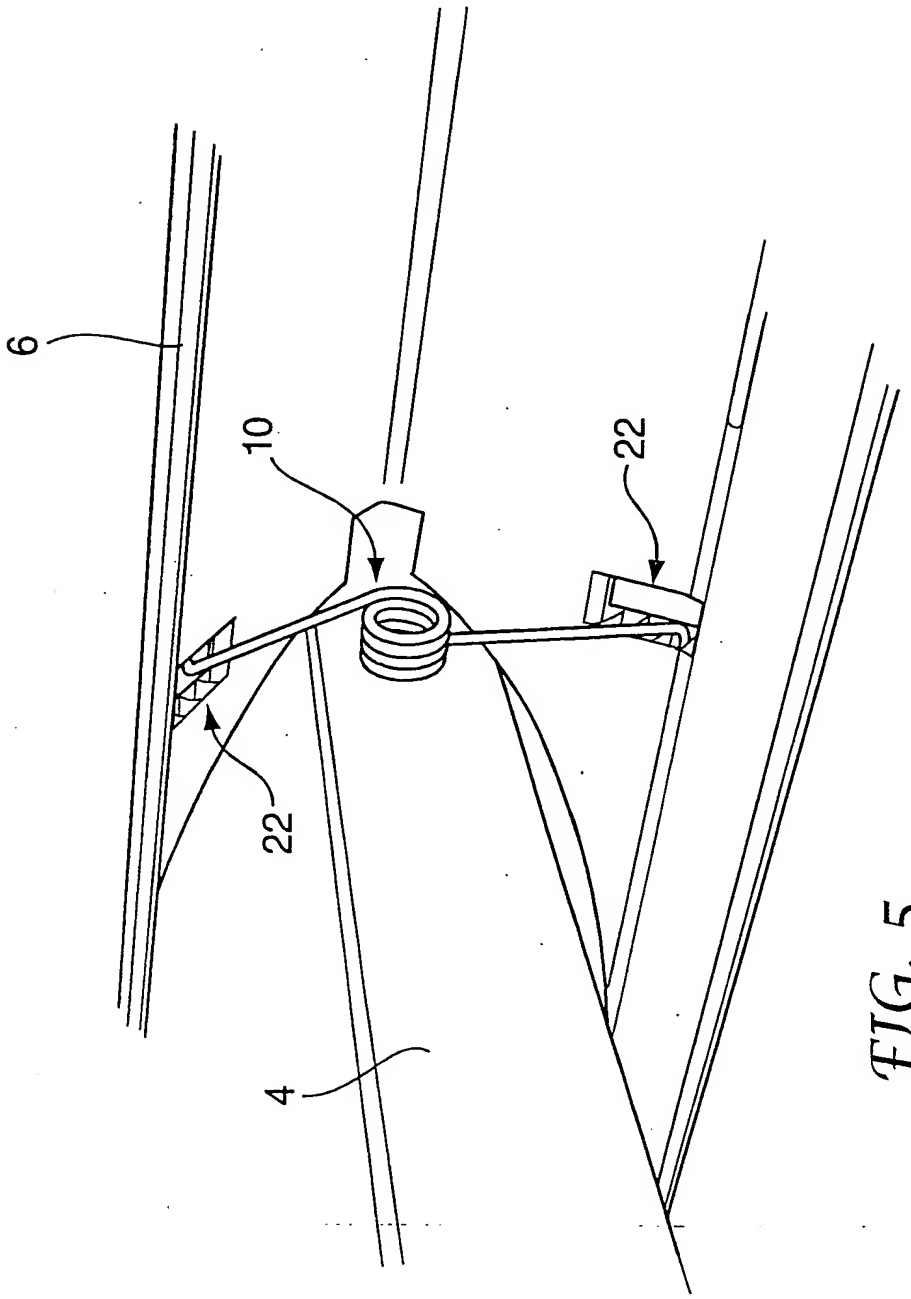

FIG. 5

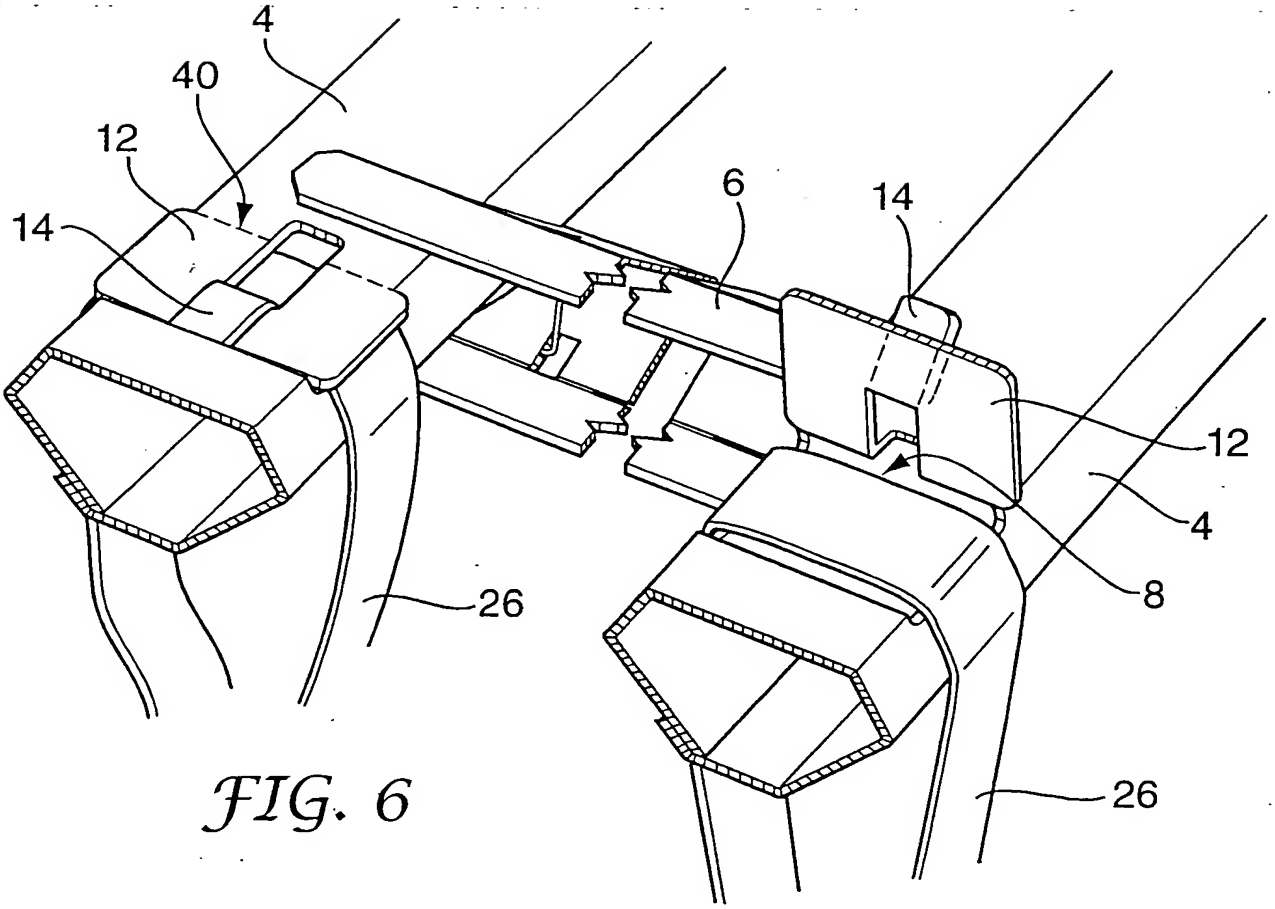

FIG. 6

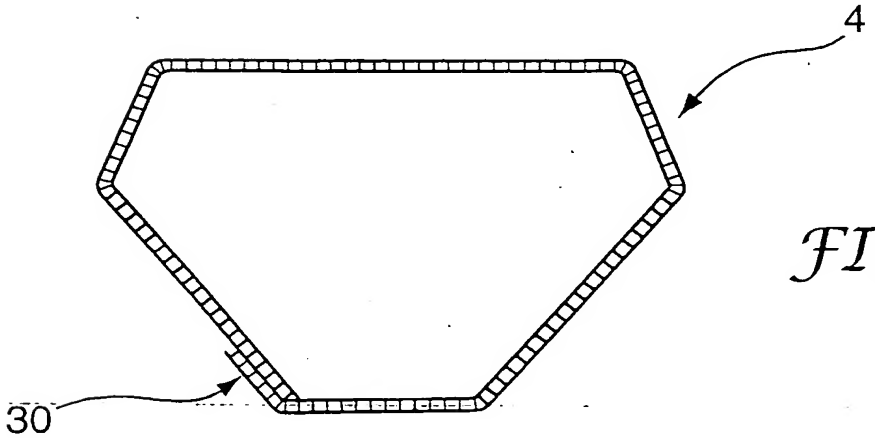

FIG. 7

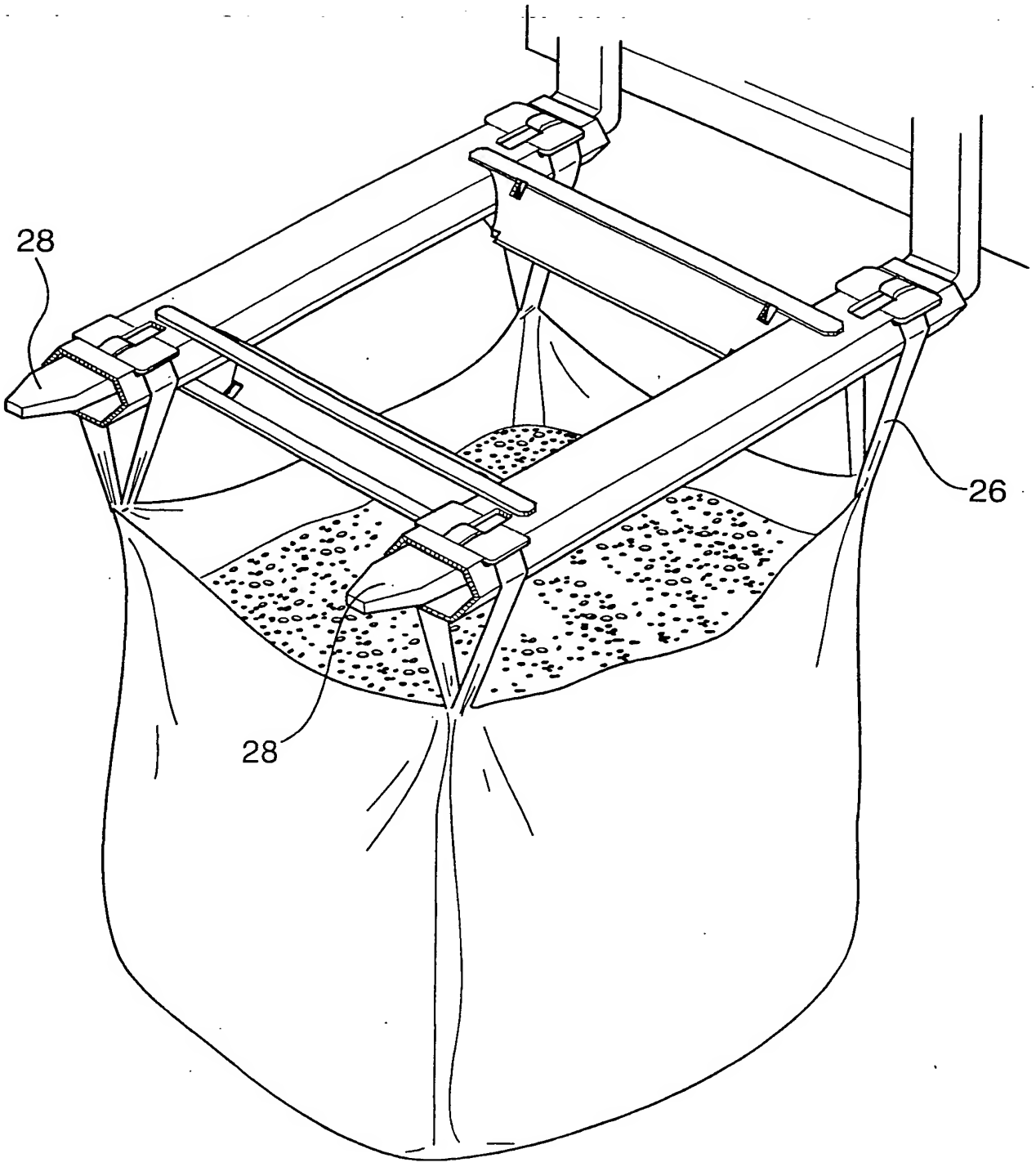

FIG. 8